Notes on Araceae of Kuala Koh, Kelantan, Peninsular Malaysia

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ABSTRACT. A total of 32 species from 11 genera of aroids were collected from Kuala Koh, Gua Musang, Kelantan. This represents about 23% out of an estimated 140 species and 39% of the 28 genera of aroids reported for Peninsular Malaysia. These include 24 species that are new records for Kelantan, including the recently described *Homalomena kualakohensis* Zulhazman, Mashhor & P.C.Boyce, and the very rare *Rhaphidophora corneri* P.C.Boyce, refound after 75 years.

Keywords. Araceae, checklist, Kelantan, Peninsular Malaysia

Introduction

The state of Kelantan is located in the northeast of Peninsular Malaysia and is fortunate to have remaining extensive areas of lowland forest and thus a rich and diverse lowland biodiversity, notably in the in the Kelantan delta. Together with extensive hill dipterocarp forests at Kuala Koh, the limestone hill and montane forests in south Kelantan and large water bodies at Pergau, resulting in a characteristic distribution of vegetation and especially composition and diversity of the aroids.

The earliest comprehensive account of the aroids of Peninsular Malaysia and Singapore is Hooker's Flora of British India (Hooker 1893), listing 89 species from 18 genera in Peninsular Malaysia. Thirty-two years later, Ridley (1925) conducted a comprehensive study on aroids of Peninsular Malaysia and recorded 123 species from 23 genera. The latest listing of aroids for Peninsular Malaysia (Mashhor et al. 2011) documents 140 species in 28 genera, which 25 species endemic. Studies on specific genera that relate to Peninsular Malaysia are those of Furtado (1939) on *Homalomena* Schott; Nicolson (1969) on *Aglaonema* Schott; Nicolson & Sivadasan (1981) on *Typhonium* (Schott); Hay (1996a) on *Colocasia* Schott; Boyce (1998) on *Epipremnum* Schott; Hay (1998) on *Alocasia* (Schott) G.Don; Boyce (1999) on *Rhaphidophora* Hassk; Nguyen & Boyce (1999) on *Amydrium* Schott; Hay (1996b) and Hay & Yuzammi (2000) on *Schismatoglottis* Zoll. & Moritzi; Bogner & Hay (2000) on *Piptospatha* N.E. Br.; Boyce & Hay (2001) on *Pothos* L.; Sofiman et al. (2009) on *Cryptocoryne* Fisch. ex Wydler., and Sofiman et al. (2010) on *Scindapsus* Schott.

To date, there is no comprehensive record of the species of Araceae in Kelantan. Previous studies on aroids related to Peninsular Malaysia, from Hooker (1893) and updated by Mashhor et al. (2011) showed that only 42 species from 15 genera recorded were collected from more than one location in Kelantan. Although there are a few surveys on plants in Kelantan, none has focussed specifically on aroids. For example, Chee et al. (2005) recorded just three species of aroids (*Algaomena nitidum* (Jack) Kunth, *Homalomena humilis* (Jack) Hook.f. and *Scindapsus scortechinii* Hook.f.) in their checklist survey on plant species of Gunung Stong Forest Reserve. Shamsul et al. (2005) also noted the same three species of aroids at different localities in the Gunung Stong Forest Reserve during their survey of seed plants. A recent survey by the first author of aroids in the granite area of the Jelawang Waterfall, Gunung Stong, revealed another novel species of aroid in Peninsular Malaysia, *Homalomena stongensis* Zulhazman, P.C.Boyce & Mashhor, ined. (Zulhazman et al. in press). The listing offered here is the first attempt to compile an inventory of the aroids for Kelantan.

Materials and methods

The study area is located in Kuala Koh at the southern part of Kelantan in the Gua Musang District, 180 km from the capital city of Kota Bharu. This area is covered with lowland moist perhumid dipterocarp forest at an average altitude of 100 m a.s.l. The surveyed area is at the confluence of two rivers, Sungai Lebir and Sungai Koh. Sungai Lebir is the main river that joins the Sungai Galas to the Sungai Kelantan at Kuala Krai.

Aroids were collected from Kuala Koh during field trips on 26–30 March and 31 May–2 June, 2010. Detailed samplings were made along a 3-km distance along the Rentis Ara. Specimens were collected with data on species identifications, habitats, elevation and location (longitude and altitude). The specimens were later brought to the Universiti Malaysia Kelantan and dried at 60°C. The dried material was processed as herbarium specimens and incorporated. The specimens were deposited to the Herbarium of Universiti Malaysia Kelantan, Malaysia. Appendix A shows the herbarium number for each specimen collected. The living specimens were planted at the Agro-Park, UMK as a pool genetic collection. The living collections are a vital resource for Araceae research. Access to a well curated living collection enables plants collected sterile to be flowered in cultivation. It facilitates crucially important enrichment of herbarium collections by enabling preparation of photographs and alcohol-preserved collections, etc. It also allows collection of fresh leaf samples for molecular data, and other materials for anatomical and developmental research.

Results and discussion

Thirty-two species from 11 genera of aroids were recorded from the study area. This represents about 23% of recorded species, and 39% of recorded genera for Peninsular

Malaysia. Appendix A lists the aroids recorded from Kuala Koh. This includes 24 species (75% of 32 species of aroids collected) which are new records for Kelantan, and one species new to science.

Six species of *Homolamena* Schott including one newly described species, *H. kualakohensis* Zulhazman, P.C.Boyce & Mashhor (Zulhazman et al. 2011) were recorded from this area. Other species are *H. pontederiifolia* Griff. ex Hook.f., *H. griffithii* (Schott) Hook.f., *H. wallichii* Schott., *H. rostrata* Griff. and an unidentified species of the Chamaecladon Supergroup.

Fifteen species from five genera of climbing aroids were collected from the area. *Rhaphidophora corneri* P.C.Boyce is one of the most remarkable species found at Kuala Koh (Boyce et al. in press). A small population of the species was located on sandy soil on ridge-tops and flat open areas. The Type and hitherto only known collection was collected by E.J.H. Corner in late 1935 from Kemaman, Terengganu (Boyce 1999).

A few aroid species were found to be significantly restricted to streams and associated gallery forests at Kuala Koh, as follows: *Schismatoglottis wallichii* Hook.f., *S. calyptrata* (Roxb.) Zoll. & Moritzi, *S. brevicuspis* Hook.f., *Apoballis brevipes* (Hook.f.) S.Y.Wong & P.C.Boyce and *A. mutata* (Hook.f.) S.Y.Wong & P.C.Boyce. *Scindapsus pictus* Hassk. was found on sloping and hilly areas. *Alocasia puber* (Hassk.) Schott, a species hitherto considered very rare in Peninsular Malaysia (Hay 1998) was noted to occur in inundated areas close to the stream.

Overall, most of the aroids found are restricted to the forest area, even though a few species such as the *Alocasia longiloba* Miq. Complex, *Amorphophallus prainii* Hook. f., and *Colocasia esculenta* (L.) Schott. can also be seen both within forest and in settlement areas. The last named is not native to Peninsular Malaysia. The most abundant species noted from this area is *Aglaonema nitidum* (Jack) Kunth. This species is distributed all over the area, especially on dry ridges.

Conclusions

This preliminary study lists 32 species in 11 genera of Araceae from the Kuala Koh, Kelantan. Among the collection, there are 24 species new for Kelantan and an undescribed species. The findings indicated that this area is relatively rich in aroids. The area should repay further study.

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Appendix A. List of aroids found in Kuala Koh, Gua Musang, Kelantan. E = endemic to Peninsular Malaysia; LC = Living collection; NR = new record for Kelantan; R = rare.

Genus	Species	Herbarium No.	Habitat	Remarks
Aglaonema	*nitidum* (Jack) Kunth	UMK 87	Dry ridges	
	simplex Blume	LC	Dry ridges	NR
Alocasia	*longiloba* Miq.	UMK 141	Ridges, open sites, dry spots, often within shrub areas	
	puber (Hassk.) Schott	UMK 139	Streambanks, wet sites	NR, R
Amorphophallus	*prainii* Hook.f.	LC	Dry ridges, often in shrub areas	NR
Amydrium	*medium* (Zoll. & Moritzi) Nicolson	UMK 92	Open canopy area, often on big trees	NR
Anadendrum	*microstachyum* de Ver & Becker	UMK 123	Shady wet areas, often on small trees	NR
Apoballis	*brevipes* (Hook.f.) S.Y. Wong & P.C. Boyce	UMK 110	Stream gallery, open areas	NR
	mutata (Hook.f.) S.Y. Wong & P.C. Boyce	UMK 104	Stream gallery, open areas	NR

Epipremnum	*giganteum* (Roxb.) Schott	UMK 128	Open canopy and dry areas, high ridges, often on big trees	NR
Homalomena	*griffithii* (Schott) Hook.f.	UMK 1	Slopes, ridges	
	pontederiifolia Griff. ex. Hook.f.	LC	Slopes, ridges	NR
	wallichii Schott	UMK 3	Slopes, ridges	NR
	rostrata Griff.	LC	Slopes, ridges	NR
	kualakohensis H. Zulhazman, M.Mashhor & P.C.Boyce	UMK 6	Slopes, ridges	NR, E
	Chamaecladon supergroup (Sp.1)	LC	Slopes, wet, stream margin, clay soil	NR
Rhaphidophora	*beccarii* (Engl.) Engl.	LC	Streambanks, on rock and soil, wet and shady area	
	corneri P.C.Boyce	UMK 31	Sandy soil, ridge-tops, flat open areas	NR, E
	falcata Ridl.	LC	Streambanks, on rock and soil, wet areas	NR
	korthalsii Schott	UMK 47	Shady wet areas, ridges, often on big trees	
	lobbii Schott	UMK 50	Shady wet areas, ridges, often on small trees	NR
	maingayi Hook.f.	UMK00033	Open canopy area, steep slopes, often on small trees	
Schismatoglottis	*brevicuspis* Hook.f.	LC	Streambanks, on wet and shady areas	NR
	calyptrata (Roxb.) Zoll. & Moritzi	UMK00059	On slopes, along the trail, shady area	
	scortechinii Hook.f.	UMK00056	Streambanks, slopes	NR, E
	wallichii Hook.f.	UMK00052	Stream gallery forests	
Scindapsus	*hederaceus* Schott	UMK00161	Open canopy areas, ridges, often on small trees, hemiepiphytic	NR
	perakensis Hook.f.	LC	Open areas, along trail, hemiepiphytic	NR
	pictus Hassk.	LC	On slopes, ridges, on soil and tree, surrounding with leaf litter	NR
	treubii Engl.	UMK00159	Shady areas, flat areas along trail, hemiepiphytic	NR
	sp.1	LC	Wet sites, hemiepiphytic	NR
	sp.2	LC	Half open canopy area, hemiepiphytic	NR